

THE NAYADES (FRESHWATER MUSSELS) OF THE
UPPER TENNESSEE DRAINAGE. WITH NOTES
ON SYNONYMY AND DISTRIBUTION.

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The present enumeration of the mussels of the upper Tennessee is the result of the writer's work carried on in this region since 1912, under the auspices of the Carnegie Museum of Pittsburgh, Dr. W. J. Holland, director.

It is intended, herein, to give a complete synopsis of this fauna, using the modern system, and the accepted rules of nomenclature, together with a full synonymy of the various forms, as far as it has been firmly established. Much stress has been laid upon the facts of the geographical distribution, because it has become evident that not all of the species are uniformly distributed in this area.

The latter includes all of the upper Tennessee drainage from Chattanooga, Tenn., upward, comprising largely eastern Tennessee, a small section of northern Georgia, and parts of North Carolina (in the high mountains), and southwestern Virginia. It appears that the Walden Gorge of the Tennessee River, below Chattanooga, forms some kind of a barrier to Nayad distribution, at least for certain species; at any rate, it forms a natural division within the Tennessee system. Of course, not all parts of this drainage have been investigated by myself; but collections have been made in all of the more important streams; and, together with the records obtained from other sources, it is believed that this fauna is now rather completely known.

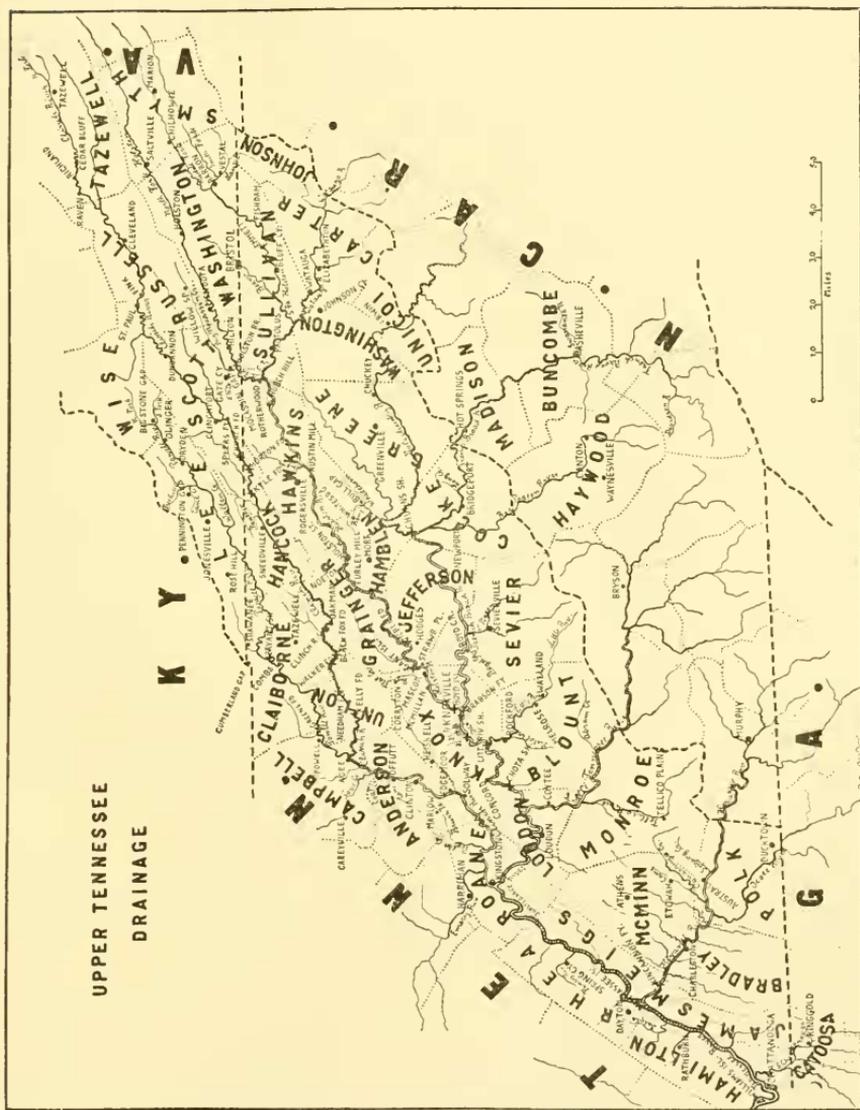
The region in question is known as one of the chief centers of Nayad development, and may be called the most prolific section of the world in this particular group. Many of the species described by the older authors (Conrad, Lea, and others) originally came from this region. But no synopsis of the whole fauna has been published, except the attempt made by Lewis (1871 and 1872).

In this connection it should be noted that Lewis's "Holston River" actually is the Tennessee River below Knoxville (chiefly in the region of Concord). Indeed, even at present, the natives in Concord call the river there "Holston"; but the maps of the U. S. Geological Survey give the name Tennessee to the river below the junction of the Holston (proper) and French Broad. In Knoxville the river is called Tennessee.

Aside from Lewis's paper, only a few are at hand which contribute to the fauna of this region. One of them has been published by Pilsbry and Rhoads (1896). This is, however, by no means a synopsis, containing hardly half of the forms which are found here. But on account of the good locality-records it is very valuable; in fact, it is, up to the present time, the most accurate publication in this respect. And further, two preliminary papers have been published, based upon my own collections; one by myself (Ortmann, 1913*b*), the other by Goodrich (1913). These, however, treat only of the headwaters-region of Powell, Clinch, and Holston in Virginia.

In addition to the material collected by myself, I have examined the upper Tennessee shells in the collection of Mr. B. Walker in Detroit, and I want to express to Mr. Walker my best thanks for the privilege of examining his shells, and the delightful days I spent in his home in April, 1916. Mr. Walker has a great number of shells from this region obtained from older collections, which in part are cotypes, topotypes, or other authentic material. But the greatest treasure in his collection are the Nayades collected by Professor Dr. C. C. Adams in 1899 to 1901, in the course of his work on *Io*, because Professor Adams always was very careful in recording his localities.

A large number of the "species" described by Lea (generally from very insufficient material), and of those listed by Lewis, are synonyms. Additional species have been subsequently described by various authors; but also these are mostly synonyms. There is a rule, observed in many cases, and indicated first by Wilson & Clark, '14, that one and the same shell assumes different shapes in the large rivers and in small streams and headwaters, a rule the existence of which will be shown elsewhere; and it is easily understood why the various local races have been regarded as good species, as long as



the intergrades were not known. But the discovery of the latter—and this was one of the problems to which I directed my attention—has necessitated the cancellation of a great number of these nominal species. Nevertheless, the fauna still remains remarkably rich, which surely in a large part is due to the comparatively old age of this river system, to the diversity of its character, and also to certain changes of the drainage which have taken place in the geological past.

In the following pages, the correct names of the various forms are given, conforming to the systematic arrangement published by the writer (Ortmann, 1910, 1912*b*), and conforming with the rules of priority. It should be remarked, that of practically all Tennessee-forms the anatomy has been investigated, but has not yet been published of all of them: the description of the rest will appear in due time. The two great papers of Simpson (1900 and 1914) are taken as a basis, and the quotations are from the last paper, so that it can be easily seen, where changes in nomenclature have been introduced. Also the names used by Lewis, those used by Pilsbry and Rhoads, by myself and Goodrich are given, in order to facilitate comparison with our list. The synonyms are all quoted unless they have been recognized and accepted as such by Simpson; but other references have been largely omitted, for the reason that they generally are found in Simpson's paper.

No full descriptions of the forms are given, but frequently the chief characters are briefly indicated.

The extralimital distribution has not been given in detail. Here and there it has been referred to, but only in especially interesting cases. In this respect, much work remains to be done, and in many North American *Nayades* the exact boundaries of the distribution have not yet been exactly located.

The material, upon which the present paper is founded, has been deposited in the Carnegie Museum of Pittsburgh, and comes chiefly from the collections made by myself; a very small part has come from other sources. The Carnegie Museum is in possession of the old collections of Hartman, Holland, and Juny, and a more recent collection has been bought from H. H. Smith. In addition, the museum is indebted to Messrs. Frierson and Walker for occasional

exchanges of rare forms. As has been mentioned above, also Walker's collection has been examined, and incidentally some of the material of the U. S. National Museum, in Washington, chiefly some of Lea's types, has been studied.

It is believed that the Carnegie Museum possesses now the best collection representing the Upper Tennessee fauna, and with regard to the illustration of the distribution of the various forms, it has no equal, not to speak of the fine collection of soft parts. In view of the gradual, slow but steady, deterioration of the fauna in consequence of stream-pollution, there is great danger that the fauna will largely become destroyed, and that it will be impossible, in the future, to duplicate this collection. At the present time, conditions are fair, in some parts splendid; but there are already polluted streams, in which the fauna is gone. Such are: the Powell River, for a certain distance below Big Stone Gap, Va. (wood extracting plant); the North Fork Holston for a distance below Saltville, Va. (salt and plaster of Paris industries); French Broad River at Asheville, N. Car. (pollution comes—as I have been informed—from Davidson River, farther up); Big Pigeon River, from Canton, N. Car., all the way down (woodpulp and paper mill); Tellico River below Tellico Plains, Tenn. (old wood pulp and extracting mill). The building of dams (for water power, etc., for instance in Nolichucky River near Greenville, Tenn.) also has a deteriorating effect upon mussel life, and all this surely will increase in the future.

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